WHAT IS CLAIMED IS:

1. A high-efficiency linear power amplifier comprising:

a digital predistorter for predistorting an input digital transmission signal thereto by use of a power-series model;

a digital-analog converter for converting the output from said digital predistorter to an analog signal;

an up converting part for frequency-converting the output from said digital-analog converter to a radio-frequency signal; and

a Doherty amplifier for power-amplifying said radio-frequency signal and for transmitting said power-amplified radio-frequency signal.

2. The high-efficiency linear power amplifier of claim 1, further comprising:

a pilot signal generator for generating a digital pilot signal;

an adder for adding said digital pilot signal to said digital transmission signal and for inputting the added output to said digital predistorter;

a pilot signal extractor for extracting a radio-frequency pilot signal from the output from said Doherty amplifier;

a down converting part for frequency-converting said extracted pilot signal to a baseband extracted pilot signal;

an analog-digital converter for converting said baseband extracted pilot signal to a digital extracted pilot signal; and

a control part for detecting an odd-order distortion component from said digital extracted pilot signal and for controlling parameters of said digital predistorter based on the detected odd-order distortion component.

3. The high-efficiency linear power amplifier of claim 1, further comprising:

a pilot signal generator for generating a digital pilot signal;

another digital predistorter for predistorting said digital pilot signal by use of a power-series model to provide a pilot signal added with an odd-order distortion component;

another digital-analog converter for converting said pilot signal added with the odd-order distortion component to an analog pilot signal;

adder for adding together said analog signal from said digital-analog converter and said analog pilot signal from said another digital-analog converter and for applying the added output as an input signal to said up converting part;

a pilot signal extractor for extracting a radio-frequency pilot signal from the output from said Doherty amplifier;

a down converting part for frequency-converting said extracted pilot signal to a baseband extracted pilot signal;

an analog-digital converter for converting said baseband extracted pilot signal to a digital extracted pilot signal; and

a control part for detecting an odd-order distortion component from said digital extracted pilot signal and for controlling parameters of said digital predistorter and said another digital predistorter based on the detected odd-order distortion components.

4. The high-efficiency linear power amplifier of any one of claims 1, 2 and 3, wherein said digital predistorter comprises:

a linear path for linear transfer of an input signal;

a nonlinear path for imparting an odd-order distortion to said input signal;

a delay memory inserted in said linear path, for providing the same delay as in said nonlinear transfer path;

an odd-order distortion generator inserted in said nonlinear path, for

generating an odd-order distortion component of said input signal; and

a vector adjuster inserted in said nonlinear path, for adjusting the amplitude and phase of said odd-order distortion component.

5. The high-efficiency linear power amplifier of claim 4, further comprising a frequency characteristic compensator inserted in said nonlinear path at at least one of input and output sides of said odd-order distortion generator, for imparting a frequency characteristic to said input signal to compensate for the frequency characteristic of a distortion produced by said Doherty power amplifier.

6. The high-efficiency linear power amplifier of claim 5, wherein said frequency characteristic compensator is an FIR filter.

7. The high-efficiency linear power amplifier of claim 5, wherein said frequency characteristic compensator comprises:

a fast Fourier transformer for transforming said input signal to a frequency domain signal;

another vector adjuster for adjusting the amplitude and phase of said frequency domain signal; and

an inverse fast Fourier transformer for transforming said adjusted frequency domain signal to a time domain signal and for providing said time domain signal as the output from said frequency characteristic compensator.

8. The high-efficiency linear power amplifier of claim 2 or 3, wherein said digital predistorter comprises:

a linear path for linear transfer of an input signal;

a nonlinear path for imparting an odd-order distortion to said input signal;

a delay memory inserted in said linear path, for providing the same delay as in said nonlinear path;

an odd-order distortion generator inserted in said nonlinear path, for generating an odd-order distortion component of said input signal; and

a vector adjuster inserted in said nonlinear path, for adjusting the amplitude and phase of said odd-order distortion component; and wherein said control part comprises:

an odd-order distortion component extracting part for extracting the odd-order distortion component from said extracted pilot signal;

a distortion component detector for detecting the level and phase of said extracted odd-order distortion component; and

an amplitude/phase controller for controlling said vector adjuster inserted in said nonlinear path of said digital predistorter based on the detected level and phase.

9. The high-efficiency linear power amplifier of claim 8, wherein said odd-order distortion component extracting part is a band-pass filter that permits the passage therethrough of the frequency of said odd-order distortion component.

10. The high-efficiency linear power amplifier of claim 8, wherein said odd-order distortion component extracting part comprises:

a linear path for transmitting said digital pilot signal with a predetermined delay;

an odd-order distortion component generator for generating an odd-order distortion component different from said odd-order distortion component of said digital pilot signal;

a nonlinear path having inserted therein a variable phase shifter and a variable gain adjuster for adjusting the phase and gain of said odd-order distortion component; and

subtracting means for subtracting the outputs from said linear path and

said nonlinear path from said digital extracted pilot signal provided from said analog-digital converter to extract said odd-order distortion component.

11. The high-efficiency linear power amplifier of claim 1, 2, or 3, wherein said Doherty power amplifier comprises: a peak amplifier that performs a class "C" operation when the amplitude of an input signal is above a predetermined threshold value; and a carrier amplifier that performs a class "B" operation at all times.